



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/532,922	03/22/2000	Bruce Emerson Wilcox	8993/108	8556

7590 04/29/2004
David E. Bennett
Coats & Bennett
1400 Crescent Green, Suite 300
Cary, NC 27511

EXAMINER

LY, NGHI H

ART UNIT PAPER NUMBER

2686

DATE MAILED: 04/29/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/532,922

Applicant(s)

WILCOX ET AL.

Examiner

Nghi H. Ly

Art Unit

2686

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE ____ MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 19 June 2003.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-56 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-56 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date ____.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. ____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: ____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

3. Claims 1-13, 15-18, 20, 21, 24-31, 33 and 35-43, 45-47, 49, 50, 53-56 are rejected under 35 U.S.C. 103(a) as being unpatentable over the Applicant's admitted prior art in view of Trikha et al (US 7,072,093).

Regarding claims 1, 26, 27, 36, 39, 55 and 56 the applicant's admitted prior art teaches a multiple antenna system (see fig.1, antennas 114 and 124), comprising: first and second antennas, a first signal circuit operatively connected with the first antenna via a first signal path and a second signal circuits simultaneously operatively connected

with the second antenna via a second signal path (also see fig.1, antenna 114 connected with circuit 112 and 124 connected with circuit 122).

The applicant's admitted prior art does not specifically disclose a first parallel tuning circuit selectively connectable in parallel with the first parallel tuning circuit selectively adjusting the impedance of the first antenna.

Trikha teaches a first parallel tuning circuit selectively connectable in parallel with the first parallel tuning circuit (see Fig.2) selectively adjusting the impedance of the first antenna (see Fig.4B, the quarter-wave length line 108, 114 and 128 all are parallel tuning circuit capable of adjusting the impedance of the antenna).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention was made to provide the above teaching of Trikha into the system of the applicant's admitted prior art in order to provide a portable transceiver for operating in two frequency bands (see Trikha, column 1, lines 55-57).

Regarding Claim 2, the applicant's admitted prior art further teaches a third antenna connected with a third signal source via a third signal path (see applicant's Background, page 1, lines 9-11, see "other wireless communications devices often employ two or more antennas").

Regarding Claim 3, the applicant's admitted prior art further teaches the first and second signal circuits are capable of generating electromagnetic signals (see applicant's Background, page 1, lines 13-15).

Regarding Claim 4, the applicant's admitted prior art further teaches the electromagnetic signals include radio frequency signals (see applicant's Background, page 1, lines 13-15 and see page 3, lines 13-27).

Regarding Claim 5, the combination of the applicant's admitted prior art and Trikha further teaches the first and second signal circuits generate signals at unique frequencies (see Trikha, Fig.2).

Regarding Claim 6, the combination of the applicant's admitted prior art and Trikha further teaches the first and second signal circuits generate signals at the same frequencies (see Trikha, Fig.2).

Regarding Claim 7, the combination of the applicant's admitted prior art and Trikha further teaches the multiple antenna system of claim 1, wherein the first and second antennas are fabricated on a common dielectric material (It is inherent that high frequency antennas can be made on a common dielectric material.).

Regarding Claim 8, the applicant's admitted prior art further teaches an antenna housing capable of housing at least the first and second antennas (see Fig.1, antennas 114 and 124).

Regarding Claims 9 and 40, the combination of the applicant's admitted prior art and Trikha further teaches the second signal circuit is capable of generating signals in multiple frequency bands (see Trikha, Fig.2).

Regarding Claims 10 and 41, the combination of the applicant's admitted prior art and Trikha further teaches the first parallel tuning circuit increases the electromagnetic

isolation between the first and second antennas in multiple frequency bands (see Trikha, Fig.4, Cellular and PCS bands).

Regarding Claims 11 and 42, the combination of the applicant's admitted prior art and Trikha further teaches the first parallel tuning circuit includes an impedance matching circuit (see Trikha, Fig.4, quarter-wave lines 108, 114 and 128).

Regarding Claims 12 and 43, the combination of the applicant's admitted prior art and Trikha further teaches the impedance matching circuit matches an impedance of the second antenna via electromagnetic coupling with the first antenna (see Trikha, Fig.4B).

Regarding Claims 13 and 28, the combination of the applicant's admitted prior art and Trikha further teaches the impedance matching circuit matches an impedance of the second antenna (see Trikha, Fig.4B).

Regarding Claims 15, 37 and 45, the combination of the applicant's admitted prior art and Trikha further teaches a second parallel tuning circuit selectively connectable in parallel to the second signal path (see Trikha, Fig. 313, 110, 112 and 126).

Regarding Claims 16 and 46, the combination of the applicant's admitted prior art and Trikha further teaches the second parallel tuning circuit increases the electromagnetic isolation (see Trikha, Figs. 1 to 4) between the first and second antenna.

Regarding Claim 17, the applicant's admitted prior art further teaches the first tuning circuit is selectively connectable to the first signal path near the first antenna

(also see fig.1, antenna 114 connected with circuit 112 and 124 connected with circuit 122).

Regarding Claims 18 and 47, the combination of the applicant's admitted prior art and Trikha further teaches the first tuning circuit creates an impedance at an input of the first antenna substantially equivalent to an open circuit at the transmission frequency of the second antenna (see Trikha, Figs. 3B and 4B).

Regarding Claims 20 and 49, the combination of the applicant's admitted prior art and Trikha further teaches each band tuning circuit creates a different impedance at an input to the first antenna associated with the connection to the first signal circuit (see Trikha, Figs. 1 to 4).

Regarding Claims 21 and 50, the applicant's admitted prior art further teaches the first tuning circuit includes a first band tuning circuit having an impedance matched to the second antenna and a second band tuning circuit having an impedance matched to a third antenna (see applicant's Background, page 1, lines 9-11, see "other wireless communications devices often employ two or more antennas" and see Trikha, Figs. 1 to 4).

Regarding Claim 24, the applicant's admitted prior art further teaches the first signal source includes a radio transceiver (see Fig.1).

Regarding Claim 25, the applicant's admitted prior further teaches the multiple antenna system is adaptable for use in a cellular telephone (see applicant's Background, page 1, lines 9-11, see "cellular" and "other wireless communications devices often employ two or more antennas").

Regarding Claims 29 and 30, the combination of the applicant's admitted prior art and Trikha further teaches the first impedance matching circuit matches an impedance of the second antenna in multiple frequency bands (see Trikha, column 2, lines 19-25).

Regarding Claim 31, Trikha teaches the selectable impedance is digitally selectable (Column 2, Lines 35-36, PIN diodes switch).

Regarding Claims 33, 35, 38, 53 and 54, the applicant's admitted prior art teaches a method in a multiple antenna system, comprising: detecting a first signal source connected with a first antenna via a first signal path is active or inactive (see applicant's Background, page 1, line 22 to page 2, line 3), detecting a second signal source, connected with a second antenna via a second signal path is active or inactive, the second antenna is disposed proximate to the first antenna to within approximately one wavelength or less (see Fig.1, second antenna 124 disposed proximate to the first antenna 114 to within approximately one wavelength or less).

The applicant's admitted prior art does not specifically disclose selectively connecting a first parallel impedance circuit in parallel with the first signal path based on the active or inactive states of the first and second signal sources.

Trikha teaches selectively connecting a first parallel impedance circuit in parallel with the first signal path based on the active or inactive states of the first and second signal sources (see Fig.4B, the quarter-wave length line 108, 114 and 128 all are parallel tuning circuit capable of adjusting the impedance of the antenna).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention was made to provide the above teaching of Trikha into the system

Art Unit: 2686

of the applicant's admitted prior art in order to provide a portable transceiver for operating in two frequency bands (see Trikha, column 1, lines 55-57).

4. Claims 14, 19, 22, 23, 44, 48, 51 and 52 are rejected under 35 U.S.C. 103(a) as being unpatentable over the applicant's admitted prior art in view of the Trikha et al (US 6,072,993) and further in view of Flaxl (US 5,729,236).

Regarding claims 14, 19, 22, 23, 44, 48, 51 and 52, the combination of the applicant's admitted prior art and Trikha teaches a plurality of switches for selectively switching reception/transmission of the RF signal between the first and second antennas (see Trikha, column 2, lines 19-25).

The combination of the applicant's admitted prior art and Trikha does not specifically disclose the first parallel tuning circuit includes a plurality of impedance matching circuits, each impedance matching circuit being independently selectively connectable in parallel to the first signal path.

Flaxl teaches the first parallel tuning circuit includes a plurality of impedance matching circuits (see fig.3 and see column 3, lines 4-5), each impedance matching circuit being independently selectively connectable in parallel to the first signal path (see Abstract and see column 2, lines 8-10).

Therefore, it would have been obvious to one of ordinary skill in the art to combine the teaching of Flaxl into the system of the applicant's admitted prior art and Trikha in order to provide an identification reader with multiplex antenna and can be

Art Unit: 2686

implemented very easily since it is not necessary to change anything inside the interrogator (see Flaxl, column 2, lines 50-53).

5. Claims 32 and 34 are rejected under 35 U.S.C. 103(a) as being unpatentable over the applicant's admitted prior art in view of the Trikha et al (US 6,072,993) and further in view of Michaels et al (US 4,549,312).

Regarding Claim 32, the combination of the applicant's admitted prior art and Trikha teaches the first impedance matching circuit dynamically adjusts impedance of the antenna (see Trikha, Fig.4B, the quarter-wave length line 108, 114 and 128 all are parallel tuning circuit capable of adjusting the impedance of the antenna).

The combination of the applicant's admitted prior art and Trikha does not specifically disclose the purpose of antenna impedance adjustment is to reduce the external interference.

Michaels teaches that the antenna impedance adjustment is based on external interference (Michaels, Column 1, Lines 36-44).

Therefore, it would have been obvious to one of ordinary skill in the art to combine the teaching of Michaels to the teaching of the applicant's admitted prior art and Trikha to extend the application of antenna tuning and matching to also include the interference cancellation by using the same techniques taught by the applicant's admitted prior art and Trikha.

Regarding Claim 34, the combination of the applicant's admitted prior art, Trikha and Michaels further teaches measuring external interference proximate to the first

antenna (see Michaels, Column 1, Lines 64-68), and adjusting the impedance of the first parallel impedance circuit based on the external interference (also see Michaels, Column 1, Lines 64-68).

Response to Arguments

6. Applicant's arguments with respect to claims 1-56 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

7. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Art Unit: 2686

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Nghi H. Ly whose telephone number is (703) 605-5164. The examiner can normally be reached on 8:30 am-5:30 pm Monday-Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Marsha Banks-Harold can be reached on (703) 305-4379. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Nghi H. Ly

NHL
04/26/04

Marsha D Banks-Harold
MARSHA D. BANKS-HAROLD
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2600